

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference S6550JV/IN	FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/IB2005/000522	International filing date (day/month/year) 24.02.2005	Priority date (day/month/year) 05.03.2004
International Patent Classification (IPC) or national classification and IPC INV. C23C16/40 C23C16/34 C23C16/30 C23C16/448		
Applicant L'AIR LIQUIDE, SOCIETE ANONYME A DIRECTOIRE ET ...		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand 05.10.2005	Date of completion of this report 13.04.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Lavéant, P Telephone No. +31 70 340- 	

**INTERNATIONAL PRELIMINARY REPORT
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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-24 as originally filed

Claims, Numbers

1-18 as originally filed

Drawings, Sheets

1/6-6/6 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-18
Inventive step (IS)	Yes: Claims	
	No: Claims	1-18
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Re Item V.

1 Reference is made to the following documents:

- D1 : WO 2004/010466 A (ASML US, INC; SENZAKI, YOSHIHIDE; LEE, SANG-IN; AVIZA TECHNOLOGY, INC)
D2 : PATENT ABSTRACTS OF JAPAN vol. 2002, no. 06 (2002-06-04)
& JP 2002 053960 A (KOJUNDO CHEM LAB CO LTD)
D3 : EP 1 028 458 A (TEXAS INSTRUMENTS INCORPORATED)
D4 : US 5 470 398 A (SHIBUYA ET AL)
D5 : OHSHITA Y ET AL: "Hf_{1-x}Si_xO₂ deposition by metal organic chemical vapour deposition using the Hf(NEt₂)₄/SiH(NEt₂)₃/O₂ gas system" PREPARATION AND CHARACTERIZATION, ELSEVIER SEQUOIA, NL, vol. 416, no. 1-2 (2002-09-02), pages 208-211

2 INDEPENDENT CLAIM 1

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

- 2.1 Document D1 discloses a Chemical Vapour Deposition (CVD) method for forming MSiON films (M=Hf, Zr, Ti,...) using a nitrogen source, an oxygen source, a silicon source and a metal source (D1: claims 1-3) the last one being vaporised in the CVD chamber (D1: page 6 line 12 to page 7 line 7) and no post-deposition steps such as annealing are disclosed.
- 2.2 In addition, document D2 discloses a CVD method for forming MSiO films (M=Hf, Zr) using an oxygen source, a silicon source and a metal source (D2: PAJ abstract), the last one being vaporised in the CVD chamber (D2: PAJ abstract) and no post-deposition steps such as annealing are disclosed.
- 2.3 In addition, document D3 discloses a CVD method for forming MSiO films (M=Hf, Zr, La, Y, ...) using an oxygen source, a silicon source and a metal source (D3: claims 1, 3-7) the last one being vaporised in the CVD chamber or before its introduction (D3: paragraph [015], "gas form"). An annealing step is disclosed but as optional step.

2.4 In addition, document D4 discloses a CVD method for forming TiSiO films using an oxygen source, a silicon source and a metal source (D4: claim 1), the last one being vaporised before its introduction (D3: column 2 lines 16 to 40 and figure 1 part 18 "heater") and no post-deposition steps such as annealing are disclosed.

2.5 In addition, document D5 discloses a CVD method for forming HfSiO films using an oxygen source, a silicon source and a metal source (D5: page 208 column 2 line 13 to page 209 column 1 line 8), the last one being vaporised, using its high vapour pressure and no post-deposition steps such as annealing are disclosed.

3 INDEPENDENT CLAIM 2

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 2 is not new in the sense of Article 33(3) PCT.

Document D1 discloses a CVD method for forming MSiON films using a nitrogen source, an oxygen source, a silicon source and a metal source (D1: claims 1-3) the last one being vaporised in the CVD chamber (D1: page 6 line 12 to page 7 line 7) and no post-deposition steps such as annealing are disclosed.

The same method without an oxygen source would produce a MSiN film and therefore the subject-matter of claim 2 is not new nor inventive.

4 INDEPENDENT CLAIM 17

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claim 17 is not new in the sense of Article 33(2) PCT. The Documents D1, D2, D3, D4, D5 disclose also MSiON or MSiO films and there is no hint that the methods described in paragraph 2 and in those documents would lead to different film compositions nor properties.

Furthermore, the chloride or carbon contamination in such layers is claimed to be low (D4: paragraph [015]), (D5: column 1 line 65 to column 2 line 1).

Furthermore, since the material noted M can also be Silicon, SiON or SiOx dielectric films are known in the art.

5 INDEPENDENT CLAIM 18

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 18 is not new in the sense of Article 33(3) PCT.

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Document D1 discloses MSiON films and the same reasoning applies as in paragraph 3.

Furthermore, since the material noted M can also be Silicon, SiNx dielectric films are known in the art.

6 DEPENDENT CLAIMS 3-16

Dependent claims 3-16 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and inventive step, where the problem to be solved is the C or Cl contamination of MSiON layers (Article 33(2) and (3) PCT).

7 INDUSTRIAL APPLICABILITY

The subject-matter of Claims 1-18 is considered to be industrial applicable and thus fulfilling the requirements of Article 34(4) PCT.

Re Item VI

Certain documents cited

Certain published documents

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
US2004/0198069	7/10/2004	4/4/2003	4/4/2003